


Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

537,211
PCT/DE2003/004015


Applicant's or agent's file reference 11415p	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DE2003/004015	International filing date (<i>day/month/year</i>) 05 December 2003 (05.12.2003)	Priority date (<i>day/month/year</i>) 05 December 2002 (05.12.2002)
International Patent Classification (IPC) or national classification and IPC B81C 1/00		
Applicant X-FAB SEMICONDUCTOR FOUNDRIES AG		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>2</u> sheets.</p>
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>

Date of submission of the demand 15 June 2004 (15.06.2004)	Date of completion of this report 20 April 2005 (20.04.2005)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DE2003/004015

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages 1-6, filed with the letter of 23 January 2004 (23.01.2004)
- ☒ the claims:
 pages _____, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages 1-4/5-9, filed with the demand
 pages _____, filed with the letter of 23 January 2004 2005 (23 January
- ☐ the drawings:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of 23 January 2004 (23.01.2004)

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig. _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DE 03/04015

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1 - 9	YES
	Claims		NO
Inventive step (IS)	Claims	1 - 9	YES
	Claims		NO
Industrial applicability (IA)	Claims	1 - 9	YES
	Claims		NO

2. Citations and explanations

Reference is made to the following document:

D1: PARAMESWARAN L ET AL: "A merged MEMS-CMOS process using silicon wafer bonding" ELECTRON DEVICES MEETING, 1995, INTERNATIONAL WASHINGTON, DC, USA, 10-13 DEC. 1995, NEW YORK, NY, USA, IEEE, US, 10 December 1995 (1995-12-10), pages 613-616, XP010161161 ISBN: 0-7803-2700-4

Document D1 is considered the prior art closest to the subject matter of the claim. It discloses (cf. final paragraph of the first page of the document; the references in parentheses are to D1):

a method for producing a microelectromechanical sensor or a system of this type (MEMS), at least one sensor and one associated sensor signal-processing electronics system being monolithically integrated, by the following steps:

- (i) a first wafer ("handle wafer") containing at least one cavity ("shallow plasma-etched cavities") and a second wafer that has an epitaxial layer ("device wafer ... with n-type epitaxial layer") are attached by means of high-temperature fusion bonding ("The two wafers are cleaned, contacted in an oxygen ambient, and annealed at 1100°C for 1 hour") to each

- other by said epitaxial layer in order to form a bond between the wafers;
- (ii) the bond between the wafers is removed from the second wafer down to the epitaxial layer and polished ("thinned using grinding and polishing");
 - (iii) after the polishing process, at least one sensor structure that is positioned at the cavity ("piezo-resistive pressure sensors" - see paragraph entitled "Mechanical characterization") and at least one analog and/or digital circuit are generated from the polished surface via a CMOS technology method ("run through a 1.75 μ m twin-well CMOS flow" - see paragraph entitled "Process flow").

The subject matter of claim 5 thus differs from the known method in that, in step (ii), the subsequent removal of material down to the epitaxial layer is not carried out by an electrochemical etching process but by polishing.

Therefore, the subject matter of claim 5 is novel (PCT Article 33(2)).

The problem to be solved by the present invention can thus be seen as that of creating a thin epitaxial membrane above the cavity, the doping of which is freely selectable.

The solution to this problem as proposed in claim 5 of the present application involves an inventive step (PCT Article 33(3)) for the following reasons:

There is no indication in document D1 of deviating from the method described there. On the contrary, it must be assumed from this document that the subsequent electrochemical etching step is essential, since, in a

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DE 03/04015

previous step, material has already been removed by grinding and polishing and the final exposure of the n-doped epitaxial layer is required as the last step in achieving the required precision in the thickness of the epitaxial layer by means of the vertical pn-junction.

Claims 6-9 are dependent upon claim 5 and thus likewise satisfy the PCT requirements with respect to novelty and inventive step.

The subject matter of claim 1, which is worded as an independent claim, largely corresponds to the subject matter of claim 5. For this reason, claims 1-5 are also novel and inventive within the meaning of PCT Article 33(2) and (3).